Jan. 14, 1964 J. A. VICTOREEN 3,118,023

TRANSDUCER HEARING AID COUPLING

Filed June 28, 1961

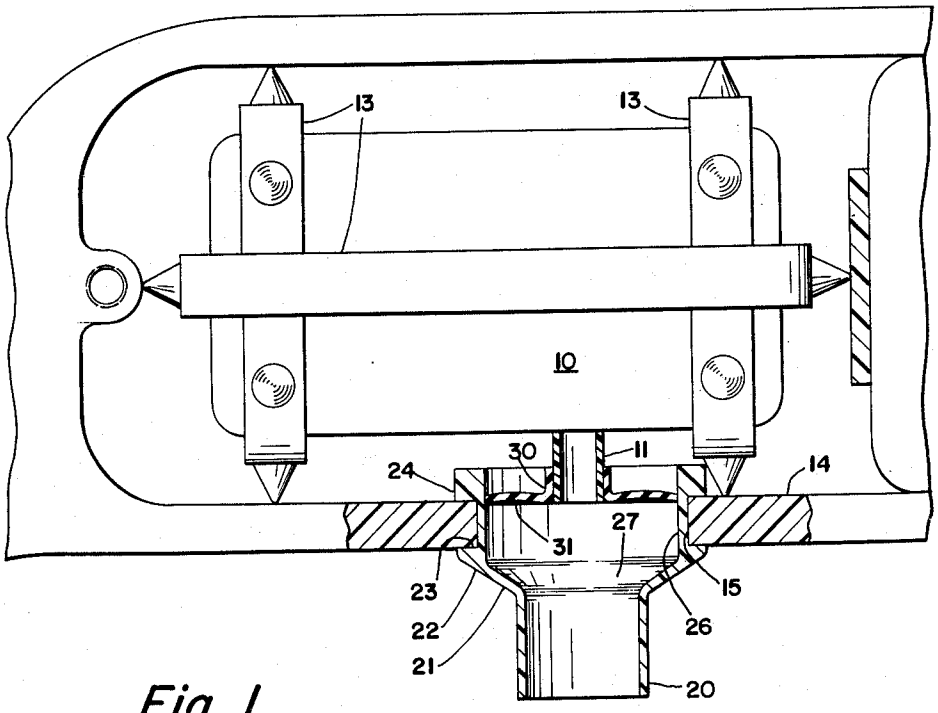


Fig. 1

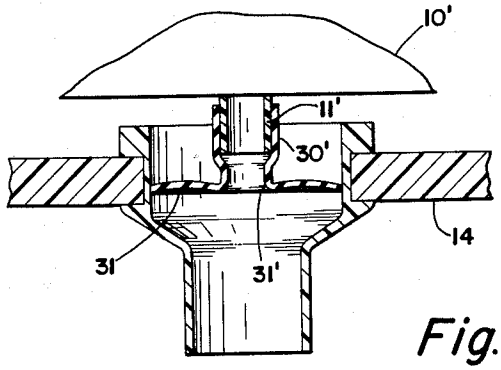


Fig. 2

INVENTOR.
JOHN A. VICTOREEN
BY
J. D. Douglass
HIS ATTORNEY

United States Patent Office 3,118,023 Patented Jan. 14, 1964

3,118,023

TRANSDUCER HEARING AID COUPLING

John A. Victoreen, Colorado Springs, Colo.
(1314 Druid Road, Maitland, Fla.)

Filed June 28, 1961, Ser. No. 120,353
2 Claims. (Cl. 179—179)

This invention relates to coupling means for connecting the sound conductive opening in a transducer disposed in a casing of a hearing aid to the exterior of the aid.

In the construction of hearing aids, particularly of the so-called eyeglass or over-the-ear types, it is necessary that the transducer, which may be a microphone or a receiver, be mounted within the casing in such a manner that vibrations from the casing to the transducer or from the transducer to the casing are eliminated.

The invention about to be described will be described particularly in conjunction with the coupling of a receiver disposed within a casing to a tube, which is exterior of the casing and has an ear plug for insertion in the ear canal. It will be appreciated, however, that the same connection can be made to the microphone when desired.

It will be appreciated that since the receiver is shock mounted within the casing that there is relative movement between the receiver and the casing which may be due to sound vibrations generated by the receiver itself and mechanical vibrations due to relative movement of the casing and the weight of the transducer which cannot follow that movement completely due to its mounting.

At the same time it is extremely essential that the sound be conducted from the receiver to the exterior without sound pressure leakage.

By the present invention it is possible to connect the sound conducting opening to the exterior of the casing without transmitting vibrations from the receiver to the casing and without sound pressure leakage.

Still other advantages of the invention, and the invention itself, will become more apparent from the following description of an embodiment thereof, which is illustrated by the accompanying drawings and forms a part of this specification.

In the drawings:

FIG. 1 is a schematic view of a receiver and its sound conducting tube connected through an enclosing casing; and

FIG. 2 is a view of a modification thereof.

In the drawings, there is illustrated diagrammatically a receiver **10**, the body of which is shown as being rectangular parallelepiped in form but which may be round or disc shaped. This receiver is supported within the casing on shock mounts **13** which may be of the character shown in my copending application Serial No. 50,464, filed August 18, 1960, to which reference may be had for details thereof. It will be appreciated that the invention is useful with any type of mounting since it performs two functions, one being that it prevents transmission of vibrations to the canal and the other that there is no sound pressure leakage.

The receiver is normally provided with a sound conducting tube **11** which projects from one side thereof. The casing **14**, usually made of plastic, is provided with an opening **15** which is considerably larger in diameter than the tube **11** and is disposed substantially coaxial therewith. Usually the casing is split and provided with a parting line

which bisects the opening **15** to allow for the insertion of a bushing forming a part of the coupling means. It is pointed out that it is quite possible to have the bushing about to be described, integral with the casing which would be particularly desirable when the sound opening was opposite to some point in the casing where it was inconvenient to have a parting line, or that a separate bushing could be molded in the casing during the formation of the casing.

In this particular illustration, the bushing comprises a tubular outer part **20** adapted to have telescoped thereover a flexible tube, not shown, one end of which carries an ear mold, also not shown, but which is well known to those versed in the art.

At the base of the tubular part **20** there is provided an outward flared base **21** which terminates in a flange **22** that forms one wall of a circumferential groove **23** for the reception of the casing **14**, adjacent the opening **15**. Interiorly of the case **14** there is provided a second flange **24** which forms the other opposite wall of the groove **23**. The bushing should have a tight fit with the casing, and, in this instance, at least one side of the opening on one side of the parting line would be cemented to the bushing.

The interior of the bushing base is provided with a smooth cylindrical bore **26** which at one end merges with a conical wall **27** which leads to the interior of the tube **20**.

It will be noted that the sound tube **11** extends well into the base bore **26**.

A seal is provided for sealing the tube **11** to the interior bore **26**, which permits movement of the tube **11** in all directions relative to the coupler bushing and still maintains a soundproof seal. In this instance, the seal comprises a tubular part **30** which telescopes over the tube **11** in tight engagement therewith and which is provided with a circumferential outwardly extending flange **31** that extends into engagement with the bore **26**. The flange **31** should be larger than the bore **26** so that a slight distortion of the flange **31** occurs in order that a good seal is assured, with a minimum of pressure. The wall thickness of the flange should be relatively thin so that it may easily flex upon movement of the tube **11** relative to the coupling. Preferably the part **30—31** should be made of a polyvinyl material having a good elasticity and elastic memory, as described in the aforesaid application.

FIG. 2 shows another embodiment of the invention wherein the tube **11'** is considerably shorter than the tube **11** and tubular part **30'** of the flexible member is considerably longer than in the other embodiment. In this instance, since the tube **11'** does not extend through the flexible member, the member may contract slightly at **31'**, otherwise the operation is substantially the same.

The flange **31** could be made so large and flexible that it would bend back upon itself and thus provide an even greater degree of flexibility.

Having thus described the invention in some embodiments thereof, I am aware that numerous and extensive departures may be made therefrom without departing from the invention as defined in the appended claims.

I claim:

1. An apparatus for connecting the sound conducting passage of a transducer, which is a tube extending from an opening in the transducer, to the exterior of a casing surrounding the transducer, wherein the transducer is shock mounted in the casing and is capable of movement

relative to the casing and the casing has an opening opposite to the tube on the transducer, comprising bushing means disposed in the opening in the casing and having a portion opening toward the transducer which is of larger inside diameter than the outside diameter of the tube, flexible means having a portion in tight sealing engagement with said tube and a flange portion in flexible bending engagement with the enlarged interior of the bushing.

2. A device as described in claim 1, wherein the portion in tight sealing engagement with the tube is also tubular and is telescoped over the transducer tube and is disposed centrally of the flange portion which is larger than the inner diameter of the enlarged interior of the bushing so that it is distorted when in position in the bushing.

References Cited in the file of this patent

UNITED STATES PATENTS

2,894,076 Posen ---------- July 7, 1959